HOW TO MAKE GOOD

waterproofed

CONCRETE

How to Make Good Waterproofed Concrete

With Medusa Waterproofed Gray Portland Cement

Medusa Portland Cement Company • 1000 Midland Bldg., Cleveland, O.

Sales Offices: New York, N. Y. • Chicago, Ill. • Grand Rapids, Mich. • Manitowoc, Wis. • Cleveland, O. • Pittsburgh, Pa. • Washington, D. C. • York, Pa. • Toledo, O.

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Why the Name Medusa?

WHEN PERSEUS was grown up, Polydectes sent him to attempt the conquest of the Gorgon Medusa, a terrible monster who had laid waste the country. She had once been a maiden whose hair was her chief glory, but as she dared to vie in beauty with Minerva, the Goddess deprived her of her charms and changed her ringlets into hissing serpents. She became a monster of so frightful an aspect that no living thing could behold her without being turned into stone. All around the cavern where she dwelt might be seen the stony figures of men and animals that had chanced to catch a glimpse of her and had been petrified at the sight. ♦ Perseus, favored by Minerva and Mercury, set out against the Gorgon and approached first the cave of the three Graeae. Here the three old crones with their single eye sat bemoaning their lot. Snatching the eye, Perseus compelled the Graeae, at the price of its restoration, to tell him how he might obtain the Helmet of Hades, that renders its wearer invisible, and the winged shoes and pouch that were necessary. With this outfit, to which Minerva added her shield and Mercury his knife, Perseus sped to the hall of the Gorgons. In silence sat two of the sisters—but the third paced about the hall moaning and shrieking in despair because the golden tresses of her hair were moved by writhing snakes from side to side. This was Medusa. While she was praying the gods to end her misery, or, as some say, while she was sleeping, Perseus approached, and, guided by her image reflected in the bright shield which he bore, cut off her head and so ended her miserable existence. The head itself he bestowed upon Minerva, who bore it afterwards upon her aegis, or shield. That is the story of Medusa. ♦ Years ago when our company was in search of a good brand name, Medusa, the name of the fabled woman of Greek mythology whose glance turned living creatures to stone was selected as most appropriate for our cement products. What could better symbolize the modern magic by which Medusa Portland Cement creates great edifices and engineering works as solid as the native rock? We believe that few products are so significantly named. And so the name Medusa, applied to products made by the Medusa Portland Cement Company of Cleveland, lives today and her magic power survives most beneficently, atoning for her malevolence by creating useful structures for the benefit of mankind.

Duke University, Durham, North Carolina

Horace Trumbauer, Philadelphia, Architect *A. C. Lea, Chief Engineer*
E. H. Clement Co., Charlotte and Durham, N. C., Stone Contractors
Medusa products furnished by W. C. Lyon Co., Durham, N. C.

Medusa Waterproofed Gray Portland Cement and Medusa Waterproofed White Portland Cement were used in the construction of this large project.

WHY Concrete, stucco and masonry, including mortar, should be waterproofed during the original construction

● For centuries past and to come, concrete has been and will continue to be one of man's most dependable and useful building materials. This dependence in concrete is due to its flexibility in application and its strength and ability to withstand the most severe construction conditions.

Concrete is usually exposed to water and moisture, ground acids and alkalies as well as acid fumes in the air. It is subject to freezing and thawing actions brought about by changes of temperature and the elements.

Because of its naturally sturdy, strong character, concrete withstands these severe conditions better than most other types of construction materials. However, even the naturally long life of concrete can be greatly extended if it is waterproofed for protection.

Waterproofed concrete means concrete that successfully **repels water at the surface.** Waterproofed concrete should not be confused with water tight concrete. In the latter case the concrete may absorb water but the water does not necessarily travel completely through the concrete itself.

The more water concrete absorbs, the sooner the concrete will need maintenance or replacement. Water absorbed into tiny crevices or cracks is subject to freezing. Freezing water expands with a terrific force which widens these tiny pores and crevices and deterioration starts in. If concrete is waterproofed, the water is repelled **at the surface** and thus the deteriorating action caused by freezing of the absorbed water is prevented.

WATER DAMAGE – The absorption of water through a concrete wall or through the mortar joints in masonry construction may cause considerable damage. Most frequently this damage consists of the ruining of plaster and interior decorations and damaging interior wood molding, floors, linoleum, carpets, etc.

MAINTENANCE—The maintenance of concrete, stucco or masonry walls when once absorption of water takes place is expensive and continuous. That's why it is highly important that these types of construction should be waterproofed during the original construction. A few additional dollars spent for waterproofed concrete, stucco and mortar at the time of building means only a very small percentage added to the cost, whereas unwaterproofed construction that absorbs moisture may be the cause of spending in repairs and damage, many, many times the cost of waterproofing during construction. It is always less expensive to waterproof during construction.

SANITATION – Interior walls and floors that have become damp through lack of waterproofing give rise to musty odors that frequently contaminate merchandise and produce mildew and rust, and oftentimes are conducive to disease. For these reasons, public health officials do not approve damp conditions in buildings used for habitation or work.

In the pages of this book we have covered the use and specifications for waterproofing many specific types of construction with Medusa Waterproofed Gray Portland Cement. This cement is mixed and used the same way as regular Gray Portland Cement and meets and exceeds all specifications for regular Gray Portland Cement.

WATERPROOFED Cement has these advantages

Medusa Waterproofed Gray Portland Cement is a true waterproofed cement. That is, it is our regular Medusa Gray Portland Cement to which has been added the correct amount of Medusa Waterproofing, mechanically ground in during the process of manufacture, thereby insuring a complete distribution of the waterproofing throughout the cement. This means that Medusa Waterproofed Gray Portland Cement will give the maximum waterproofing value. The use of a waterproofed cement—that is a cement with the correct amount of waterproofing added at the mill during the process of manufacture—has a number of decided advantages over adding a waterproofing material to the cement at the time of mixing on the job.

The contractor or builder likewise benefits from the use of waterproofed cement in that he, too, has less supervision and one less material to handle on the job. Medusa Waterproofed Gray Portland Cement requires no special effort to handle, since it is used the same as regular Gray Portland Cement.

The most vitally interested party, however, is the owner and he should insist that Medusa Waterproofed Gray Portland Cement be used in his work. The use of this cement assures him of permanent waterproofing at a very small additional cost.

Let us emphasize that it does not require any special knowledge to use Medusa Waterproofed Gray Portland Cement. Anyone who knows how

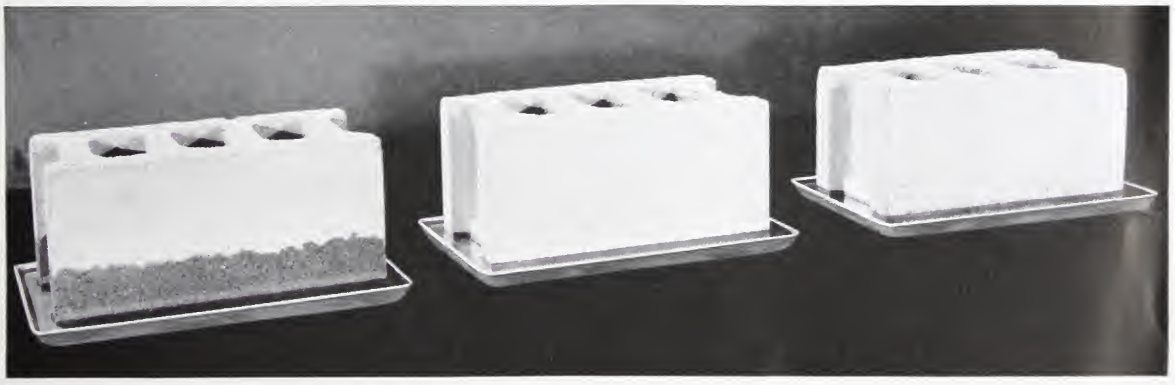
High School, Winston-Salem, North Carolina Harold Macklin, Architect F. L. Blum & Co., Contractors Standard Supply Co., Dealer
Medusa Waterproofed Gray Portland Cement used.

Today most architects prefer a waterproofed cement because it eliminates the supervision necessary to insure the proper amount of waterproofing is used. The specification, therefore, of Medusa Waterproofed Gray Portland Cement eliminates the human-element hazard always present when waterproofing agents are added on the job. This means the resulting concrete is sure to be permanently waterproofed and the owner satisfied.

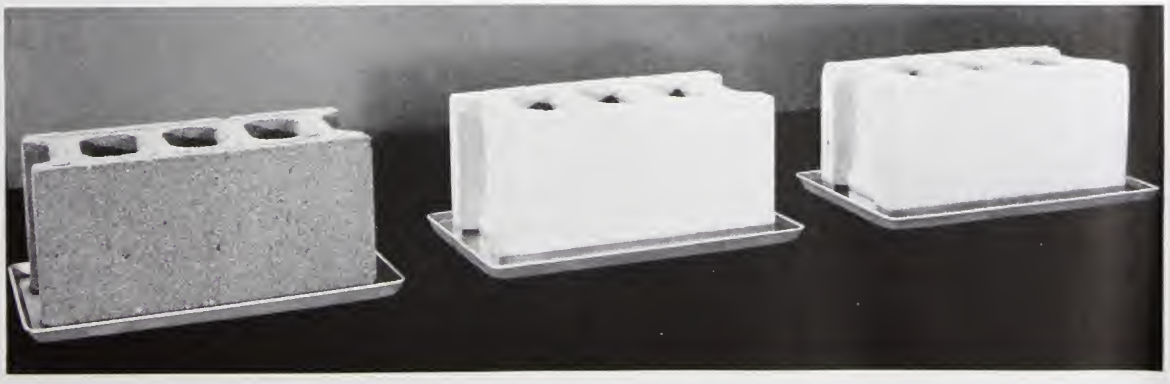
to make good concrete can make good waterproofed concrete with Medusa Waterproofed Gray Portland Cement. There is no question as to the waterproofing efficiency of this cement. It has a service record of 32 years, having been used in countless jobs below and above grade under unusually severe conditions, and has been thoroughly tested in concrete as well as in mortar for laying up brick, tile, concrete blocks, stone, etc.

PROVING the value of Medusa Waterproofing

Three concrete blocks—left made with regular cement, center with Medusa Waterproofed Gray Portland Cement and right with Medusa Concentrated Waterproofing Paste—were placed in pans which were filled with water.



In 15 minutes water has risen by capillary attraction half-way up the unwaterproofed block. The Medusa Waterproofed blocks show no rise because the water was repelled at the surface of the concrete.



At the end of an hour the unwaterproofed block was wet all over and the Medusa Waterproofed blocks were dry, proving the efficiency of Medusa Waterproofed Gray Portland Cement and Medusa Concentrated Waterproofing Paste in stopping absorption of water at the surface of the concrete blocks.

ESSENTIALS of good waterproofed concrete

CONCRETE—Concrete is a mixture of portland cement, water and mineral aggregates placed in a plastic condition but hardening soon after, due to the process known as hydration of the cement. Since concrete is placed in a plastic condition, it cannot be tested for quality at the time of fabrication. However, by proper control of the proportioning, mixing and placing together with the subsequent curing, it is possible to produce concrete of any quality to meet the requirements of the work.

The fundamental requirements of hardened concrete are strength, waterproofness, durability and economy. Fresh concrete must be workable, that is, it must be of such consistency and physical make-up that it can be readily placed in the form without segregation of the materials and without requiring an excessive amount of spading to completely fill the form. Uniformity in the fresh concrete is necessary to secure durability of concrete, to facilitate handling and placing and to obtain uniformity in the complete structure. It is particularly important where waterproofness is required.

STRENGTH—Most concrete design is based on compressive strength. However, the flexural and tensile strength, the bond with steel reinforcement, and the resistance to wear are in general governed by the same factors that govern the compressive strength. The compressive strength, therefore, may be used as an indication of these other qualities and, since the test for compressive strength is comparatively simple, it is the test that is most often adopted.

DURABILITY—If structures are to give long service, the durability of the materials is just as important as the strength. In the past this has not been fully appreciated and too much emphasis has been placed on strength and economy alone. The most important factor affecting durability of exposed concrete is its waterproofness. A concrete that will stand up for a long time requires sound, durable aggregates thoroughly incorporated in a waterproofed cement paste.

ECONOMY—While economy of materials is important, there are other factors affecting the economy of concrete which should receive more consideration. The amount of labor required in placing and finishing concrete is a considerable item in the total cost. Labor cost is lowest when the mixture used is most easily placed. The ease of placing varies with the plasticity of the mix. The most economical concrete is not the mix having the lowest cement factor nor the mix with the lowest cost for materials, but is the mix for which total cost—materials, handling and placing—is the lowest.

WORKABILITY—The workability required varies with different classes of work and is determined by the methods of transporting and the details of placing—width and depth of forms and spacing of reinforcement. Plastic concrete may be regarded as a mass of aggregate particles, individually floated in a cement paste. This gives a mass that can be transported without segregation and can be placed easily in such a manner that when the forms are removed the hardened concrete will have smooth surfaces, free from honeycombing. Concrete of such consistency requires a minimum amount of finishing. In much of the practice in the past, such concrete has not been obtained. This was largely due to the fact that arbitrary mixtures were specified which did not permit adjustments in the mix to suit the character of materials, the condition in which they were measured or the placing requirements of the job. In the endeavor to obtain workable mixtures, excess water was often added which almost invariably resulted in segregation, porosity and low strength. For directions on how to avoid these faults, see sub-heads "Water" and "Mixing" under Specifications on page 20.

UNIFORMITY—Uniformity is important since all parts of a structure designed for the same strength should be made of concrete of the same quality. Moreover, the best economy can be obtained only by the use of uniform batches of concrete. Uniformity is best secured by using plastic concrete made homogeneous by thorough mixing of uniformly measured quantities of materials.

A *Successful* SERVICE RECORD

(Upper Left) *1910 Pittsburgh Natatorium, Pittsburgh, Pa., F. A. Burdett, New York. N.Y., Engineer. Grosvenor Atterbury, New York, N. Y., Architect.*

(Center Left) *1917 Inland Steel Company, Indiana Harbor, Ind. Entrance to tunnels connecting Company's Plants No. 1 and No. 2. Brownell Improvement Co., Chicago, Ill., General Contractors.*

(Lower Left) *1924 Northland Hotel, Green Bay, Wis. Martin Tullgren & Sons, Milwaukee, Wis., Architects. Tudolf, Hansen Const., Green Bay, Wis., Cement Work.*

(Upper Right) *1923 Hotel Retlaw, Fond du Lac, Wis. Martin Tullgren & Sons, Milwaukee, Wis., Architects. The Immel Const. Co., Fond du Lac, Wis., Contractors.*

(Center Right) *1918 Basement, Treleven Department Store Building, Fond du Lac, Wis.*

(Lower Right) *1922 Municipal Administration Building, Kaukauna, Wisconsin. W. E. Reynolds, Green Bay, Wisconsin, Architect. John Coppes, Kaukauna, Wis., Contractor.*

WATERPROOFING Concrete and masonry below grade level

An actual photograph of a damp basement. The use of Medusa Waterproofed Gray Portland Cement would have prevented this condition.

The above photograph was taken in a "typical" damp or wet basement. This condition could easily have been prevented had Medusa Waterproofed Gray Portland Cement been used in the concrete and mortar, and in exterior and interior plaster coats. The exterior of all basement walls, in fact any concrete or masonry below grade is subject to ground water, ground acids and earth dampness. The use of Medusa Waterproofed Gray Portland Cement prevents wet basements.

Monolithic concrete construction for basement walls and floors has many advantages over other methods. The use of Medusa Waterproofed Gray Portland Cement with this type of construction gives a waterproofness to the basement because a water repellent substance is incorporated integrally throughout the entire mass of the concrete. The advantage of mill mixed waterproofed cement containing the proper amount of waterproofing uniformly distributed throughout the cement can be secured by specifying and using Medusa Waterproofed Gray Portland Cement.

PRECAST UNITS—When brick, stone or tile is used as the construction unit for the wall, it is imperative that these precast units be laid in a mortar made with Medusa Waterproofed Gray Portland Cement (see mortar specifications). When concrete block is used, the blocks should likewise be manufactured with Medusa Waterproofed Gray Portland Cement and laid up with waterproofed mortar made with Medusa Waterproofed Gray Portland Cement according to mortar specifications.

Waterproofing is particularly recommended for all types of below grade construction such as swimming pools, elevator pits, mine shafts, basement caissons, etc. Medusa Waterproofed Gray Portland Cement should be used for all these types of construction and in fact, all concrete and masonry below grade.

PROTECTING above grade level concrete, masonry and stucco surfaces against disintegration

All above grade construction, whether it be of concrete, stucco, brick, cinder blocks, concrete bricks or any other type of masonry, should be protected by waterproofing, especially if it is exposed to the elements.

There are many causes of disintegration of exposed surfaces. The freezing and the thawing action of water absorbed by exposed surfaces is very destructive and causes disintegration and spalling. The force exerted by the freezing of confined water will break open a cannon ball. This same terrific force is exerted when water absorbed into the pores and crevices of a wall freezes. This may open up mortar joints and leaky mortar joints permit the entrance of moisture, destroying interior decorations and creating very unpleasant conditions.

Frequently acid fumes of the air combined with rain water become a disintegrating factor when absorbed into masonry, stucco or concrete walls. Unwaterproofed mortar is a factor in the appearance of white efflorescence which gives an unsightly appearance to masonry walls. It is caused by absorbed water dissolving alkali salts and then depositing them on the surface when the water evaporates. The use of Medusa Waterproofed Gray Portland Cement in stucco, concrete, concrete bricks, blocks as well as in mortar for laying up these and other masonry units will prevent absorption of water through repelling all water at the surface, thus stopping disintegration and efflorescence and prolonging the life of concrete and masonry indefinitely. The cost of waterproofing with Medusa Waterproofed Gray Portland Cement is very small and is only a fraction of the expense necessary in maintaining and repairing leaky, damp, above grade construction, consequently it is advisable to waterproof the original construction.

Dollar Savings & Trust Company Building
Press C. Dowler, Architect D. T. Riffle, Pittsburgh, Pa., Contractor
Hillside Stone & Supply Co., Pittsburgh
Medusa Waterproofed Gray Portland Cement used in all the brick mortar.

SPECIFICATIONS for waterproofing concrete foundation walls and basement floors

PORTLAND CEMENT—To insure the uniformity of the waterproofed cement, specify and use Medusa Waterproofed Gray Portland Cement.

PROPORTIONS—The concrete shall be mixed in the proportions of one sack of Medusa Waterproofed Gray Portland Cement, two and one-half cubic feet of fine aggregate, and three to four cubic feet of coarse aggregate.

Where concrete must resist moisture or dampness, the mix should never be any leaner than 1:2:4. Leaner mixes are more porous, being less dense than the richer mixes.

The richer mixes should be used where greater strength is required or where the exposure to water is quite severe, such as sea water work, swimming pools, large tanks or reservoirs.

AGGREGATE—Fine aggregate shall consist of sand or screenings from crushed rock or pebbles, well graded from fine to coarse, passing, when dry, a screen having four meshes to the linear inch. Fine aggregate shall not contain injurious amounts of vegetable or other organic matter.

Coarse aggregate shall consist of hard crushed rock or gravel, free from vegetable or other organic matter, and shall be free from soft, flat or elongated particles. It shall be well graded from ¼ inch to one inch in size, not more than fifteen per cent passing a screen having four meshes per linear inch.

WATER—Just enough water should be used in mixing the concrete as will give a plastic, workable consistency which can be economically placed. An excess of water must be avoided. It is recommended that not more than six gallons of water be used per sack of cement.

MIXING—Medusa Waterproofed Gray Portland Cement is used in a concrete mixer exactly the same as regular portland cement. However, proper mixing is made easier by putting two or three gallons of water in the mixer before the aggregate and cement are put in. The minimum mixing time per batch is one and one-half minutes. The cement contains the proper percentage of waterproofing. The contractor must not use any more gauging water than will give a jelly-like or mushy concrete. Concrete containing sufficient water to permit a settling or segregation of the heavier ingredients shall be rejected.

SPADING—Concrete must be thoroughly spaded into place, well around reinforcing steel and against the forms, so as to secure maximum density by forcing out air and breaking up water and stone pockets, preventing honeycombed places.

CURING—All concrete should be kept wet continuously for a period of at least seven days. Unlike regular cement, once waterproofed cement dries out it repels all water at the surface, hence cannot be wet again for proper curing.

FLOORS—Where two-course basement floors are to be used the slab should be thick enough and sufficiently reinforced to resist the upward pressure of any water that may gather under the floors. Concrete should be no leaner than a 1:2:4 proportion, mixed with a minimum amount of water and properly placed upon a well tamped cinder or rock fill which has been saturated before the concrete is poured.

Whether the 1" or 2" finished topping of a two-course floor should be waterproofed will depend upon the use the floor will have. Oftentimes it is sufficient to waterproof only the slab.

For topping see page 14, Specifications for bonded Concrete Floor Finish.

Where water conditions surrounding a house or building are not taken care of by drain tile, the concrete floors should be reinforced with steel bars, wire mesh or expanded metal mesh sufficiently to overcome the pressure of water which may gather under the floor.

TYPICAL METHODS OF WATERPROOFING BASEMENT WALLS USING MEDUSA WATERPROOFED PORTLAND CEMENT

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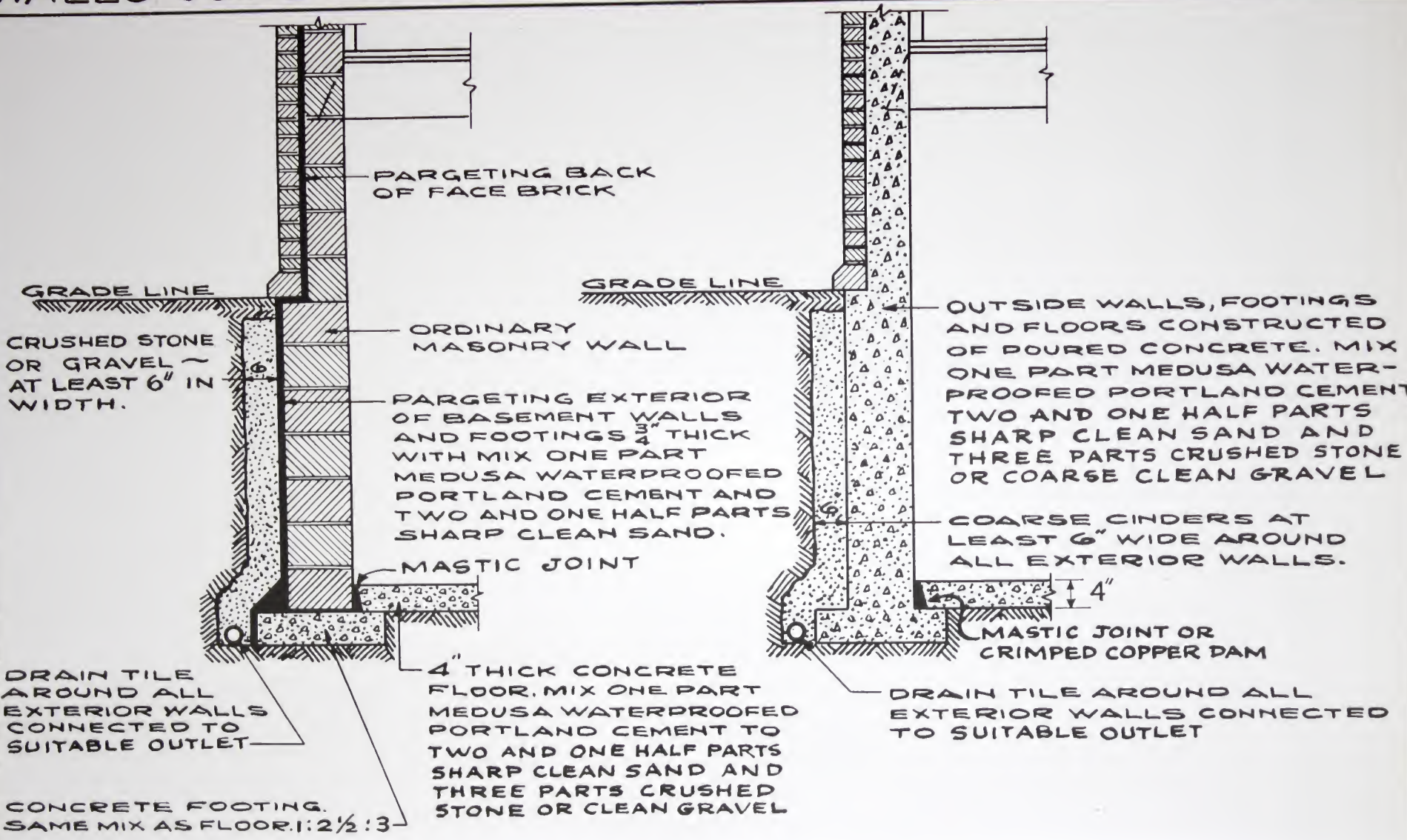


BASEMENT WALL WITH ORDINARY MASONRY CONSTRUCTION WATERPROOFED BY PARGETING.

BASEMENT WALL OF POURED WATERPROOFED CONCRETE.

MEDUSA PORTLAND CEMENT CO. 1000 MIDLAND BLDG. CLEVELAND O.

SPECIFICATIONS for bonded concrete floor finish

BASE SLAB—The surface of the structural base slab shall be finished reasonably true and struck off at a level not less than one inch below the required finish grade.

As soon as the condition of the concrete base permits and before it has fully hardened, all dirt, laitance and loose aggregate shall be removed from the surface by means of a wire broom, which shall leave the coarse aggregate slightly exposed, or the surface otherwise roughened to improve bond with the topping.

When impossible to remove laitance and roughen slab, surface shall be cleaned and prepared for bond by chipping after base has hardened.

Just prior to placing the finish, the base slab shall be thoroughly cleaned by scrubbing, to the satisfaction of the engineer.

PORTLAND CEMENT—Portland cement shall be Medusa Waterproofed Gray Portland Cement.

AGGREGATES—Both fine and coarse aggregates shall be used in the finish. Fine aggregates shall consist of clean, hard sand or crushed stone screenings free from dust, clay, loam or vegetable matter. All particles shall pass a ¼-inch sieve and shall be graded from fine to coarse with the coarse particles predominating. Not more than five per cent shall pass a 100-mesh sieve and not more than 15 per cent shall pass a 50-mesh sieve.

Coarse aggregate shall consist of clean, hard gravel or crushed stone free from dust, clay, loam or vegetable matter and from coatings which shall tend to weaken the bond. It shall contain no soft, flat or elongated fragments and shall be graded from ⅛ to ⅜ inch with not less than 95 per cent passing a ⅜ inch mesh sieve and not more than 10 per cent passing a No. 8 sieve.

All aggregate shall be selected with care. Coarse aggregate shall be of an approved character and samples of proposed material shall be submitted to the engineer for approval prior to use.

MIXTURE—The mixture shall be one part of Medusa Waterproofed Gray Portland Cement, one part of fine aggregate and two parts of coarse aggregate by volume. This nominal mix may be slightly varied, depending upon the local conditions and as the engineer may direct. If the aggregate is very coarse, the gravel or stone may be reduced, but in no case shall the volume of the coarse material be less than 1½ times the volume of the fine.

The mixture shall be determined by the engineer and once established shall not be changed except upon his written order.

Not more than five gallons of mixing water, including the moisture in the aggregates, shall be used for each sack of portland cement in the mixture.

Mixing of the concrete shall continue for at least two minutes after all ingredients are in mixer.

CONSISTENCY—The concrete shall be of the driest consistency possible to work with a sawing motion of the strike-off board, or straightedge. Changes in consistency shall be obtained by adjusting the proportions of fine and coarse aggregate within the limits specified. In no case shall the specified amount of mixing water be exceeded.

PLACING AND COMPACTING—The base slab shall be thoroughly wetted just prior to the placing of the finish, but there shall be no pools of water left standing on the wetted surface. A thin coat of neat cement grout shall be broomed into the surface of the slab for a short distance ahead of the topping. The wearing course shall be immediately applied before the grout has hardened, and brought to the established grade with a straightedge. After striking off the wearing course to the established grade, it shall be compacted by rolling or tamping, and then floated with a wood float or power floating machine. The surface shall be tested with a straightedge to detect high and low spots, which shall be eliminated.

FINISHING BY TROWELING—Floating shall be followed by steel troweling after the concrete has hardened sufficiently to prevent excess fine material from working to the surface. The finish shall be brought to a smooth surface free from defects and blemishes. No dry cement nor mixture of dry cement and sand shall be sprinkled directly on the surface of the wearing course to absorb moisture or to stiffen the mix. After the concrete has further hardened, additional troweling may be required. This shall be done as may be directed by the engineer.

Note: Surfaces to be ground shall be swept with soft brooms after rolling to remove any water and surplus cement paste that may be brought to the surface. The wearing course shall then be floated and once lightly troweled, but no attempt shall be made to remove all trowel marks.

FINISHING BY GRINDING—After the wearing course has hardened sufficiently to prevent dislodgement of aggregate particles, it shall be ground down with an approved type of grinding machine shod with free, rapid-cutting carborundum stones to expose the coarse aggregate. The floor shall be kept wet during the grinding process. All material ground off shall be removed by squeegeeing and flushing with water.

Air holes, pits and other blemishes shall then be filled with a thin grout composed of one part of No. 80 grain carborundum grit and one part of portland cement. This grout shall be spread over the surface and worked into the pits with a steel straight-edge, after which the grout shall be rubbed into the floor surface with the grinding machine.

After all patch fillers have hardened for seven days, the floor surface shall receive a second or final grinding to remove the film and to give the finish a polish. It shall then be thoroughly washed and all surplus material removed.

CURING AND PROTECTION—All freshly placed concrete shall be protected from the elements and from all defacement due to building operations. The contractor shall provide and use tarpaulins when necessary to cover completely or enclose all freshly finished concrete.

If at any time during the progress of work the temperature is, or in the opinion of the engineer will, within twenty-four hours, drop to 40 degrees Fahrenheit, the water and aggregate shall be heated and precautions taken to protect the work from freezing for at least three days.

As soon as the concrete has hardened to prevent damage thereby, it shall be covered with at least one inch of wet sand, or other covering satisfactory to the engineer, and shall be kept continually wet by sprinkling with water for at least seven days.

WATERPROOFING mortar for masonry

SPECIFICATIONS—The following specifications have been used on many buildings with perfectly satisfactory results.

The Waterproofed Portland Cement mortar shall consist of:

1 part Medusa Waterproofed Gray Portland Cement

3 parts clean, well-graded mason's sand

10 pounds hydrated lime per bag of cement, or one-fifth part by volume of the cement used

MIXING—If a contractor has the proper equipment he will find it quite advantageous to have his batches of mortar mixed ahead of time, using just enough water in the preliminary mix to make a damp earth consistency and allowing this mortar to set for any period of time up to one hour after the mixing, and then when required for use, more water is added to bring the mortar to the proper consistency.

It has been found that mortar mixed in this way has greater plasticity and workability than freshly mixed mortar, as well as a greater ultimate strength.

The increased workability and plasticity in the mortar enables the mason to lay a greater number of bricks in a given time than where freshly mixed mortar is used, and this saving in labor overcomes the slight expense involved in running two mixing boxes.

Valley Stream High School, Long Island, Frederick P. Wiedersum, Valley Stream, N. Y., Architect. Zerbe Construction Co., New York City. Medusa Waterproofed Gray Cement used throughout brick work.

WATERPROOFED WITH

Allied Arts Bldg., Lynchburg, Va. Medusa Wat
Gray Portland Cement used in foundations and retain

(Upper Left) ***Swimming pool at La Crosse, Wis. Nelson & Fursch, Architects. Constructed by National Builders Inc., Minneapolis. One car of Waterproofed White Portland Cement used.***

(Center Left) ***Girls' Dormitory, University of Michigan, Ann Arbor, Mich. Contractor, Pehrson Bros., Minneapolis, Minn. Dealer, W. H. L. Rohde, Ann Arbor, Mich. 8 cars of Medusa Waterproofed Gray Portland Cement used.***

(Lower Left) ***Anthony Wayne Hotel Hamilton, O. Contractor, F. K. Vaughn Bldg. Co. Architects, Fred G. Mueller & Walter R. Hair, Assoc., Hamilton. Medusa Waterproofed Gray Portland Cement used.***

ED WITH MEDUSA

burg, Va. Medusa Waterproofed in foundations and retaining walls.

(Upper Right) *Basement Paper Storage Room of printing plant of United Lutheran Publication Society, 5001 Lancaster Ave., Philadelphia, Pa. Medusa Waterproofed Portland Cement used in foundation and floors.*

(Center Right) *Printing plant of United Lutheran Publication Society, Philadelphia, Pa. Harris & Richards, Architects, Philadelphia. Foundation and floors completely waterproofed with Medusa Waterproofed Gray Portland Cement.*

(Lower Right) *Waxing Plant, Badger Paper Mills, Peshtigo, Wis. Willard J. Fahrenbrug, Construction and Maintenance Engineer. Wm. Harper & Sons, Peshtigo, Dealers. 600 Barrels Medusa Waterproofed Gray Portland Cement used.*

Lambert, Barger & Branaman Building, Waynesboro, Virginia
C. W. Hinnant, Lynchburg, Architect W. K. Smith, Jr., Associate Architect
H. S. Brooks, Waynesboro, Contractor Lambert Mfg. Co., Waynesboro, Dealer
Medusa Waterproofed Gray Portland Cement used.

Carl Hansen Laboratory, West Allis, Wisconsin
W. H. Buemming, Arch., Milwaukee, Wis. Osthoff & Peterson, Engs., Milwaukee
W. W. Oeflein, Inc., Contractor, Milwaukee, Wis.
Tews Lime & Cement Co., Dealers, Milwaukee, Wis.
Medusa Waterproofed Gray Portland Cement used.

American Telephone and Telegraph Co. Repeater station, Ridgeville, Ohio
Mills, Rhines, Bellman & Nordjoff, Architects, Toledo, Ohio
W. J. Schirmer Co., Contractors, Cleveland, Ohio
Medusa Waterproofed Gray Portland Cement used in all floors, foundations and for brick mortar.

Swimming pool, H. S. Black Estate, Mansfield, Ohio
Althouse & Jones, Architects The Jacob Wolf Co., Contractors
Builders Supply Co., Dealers
Medusa Waterproofed Gray Portland Cement used.

SPECIFICATIONS for waterproofed Portland Cement Stucco

The following fundamental rules must be observed in the production of good stucco:

a—Use a good rigid base which will not shrink, warp, bend or deteriorate with time.

b—Use proper proportions and carefully selected sand and aggregates of correct grading.

c—If an absorbent base, such as hollow tile, concrete block or brick is used, sprinkle before applying fresh stucco.

d—All stucco coats—base or scratch coat, second or brown coat, third or finish coat—should be waterproofed. This is just as important in the case of the base coat as any other, since the base coat must not possess sufficient "suction" or absorptive tendency to take up the water from the fresh cement plaster or stucco coat applied to it before the cement has had an opportunity to hydrate and set.

e—Each stucco coat must be sprinkled with water before applying the next coat; and the finish coat must be kept evenly moist by sprinkling. In hot weather the work must be shielded from the direct rays of the sun, and protected at all times from the wind. **The importance of these precautions cannot be overestimated.**

1. DESIGN—Whenever the design of the structure permits, an overhanging roof or similar projection is recommended to afford protection to the stucco. It is well for the architect to prevent concentration of water flow getting at the stucco at all, so as to avoid staining of the finish. Stuccoed copings, cornices, and other exposed horizontal surfaces should shed water quickly, and whenever departure from the vertical is necessary (at water tables, belt courses, and the like) the greatest possible slope should be obtained. Stucco should not be run to the ground—but should have a water table or belt course which is high enough above the ground to avoid splashing of mud and dirt upon the finished surface. The backing should be of tile, brick, stone, concrete or metal lath, providing good mechanical bond for the stucco. It must be thoroughly cleaned before plastering.

2. FLASHINGS—Suitable flashing should be provided over all door and window openings wherever projecting wood trim occurs. Wall copings, cornices, rails, chimney caps, etc., should be built of concrete, stone, terra cotta or metal, with water-tight joints and ample overhanging drip groove or lip.

If copings are set in blocks with mortar joints, continuous flashing should extend across the wall below the coping and project beyond, forming an inconspicuous lip over the upper edge of the stucco—or the copings may be set in mortar composed of Medusa Waterproofed Portland Cement and sand. Continuous flashing with similar projecting lip should be provided under brick sills. This flashing should be so installed as to insure absolute protection against interior leakage.

Cornices set with mortar joint should be provided with flashing over the top or set in mortar composed of Medusa Waterproofed Portland Cement and sand. Sills should project well from the face of the stucco and be provided with drip grooves or flashings as described above for brick sills. Sills should also be provided with stools or jamb seats to insure wash of water over the face and not over the ends.

Special attention should be given to the design of gutters and downspouts at returns of porch roofs where overflow would result in discoloration and cracking. A two-inch strip should be provided at the intersection of walls and sloping roofs and flashing extended up and over it, the stucco being brought down to the top of the strip.

3. PREPARATION OF ORIGINAL SURFACES—All roof gutters should be fixed and downspout hangers and all other fixed supports should be put in place before the plastering is done, in order to avoid breaks in the stucco. All trim should be placed in such manner that it will show its proper projection in relation to the finished stucco surface, particularly in overcoating.

MATERIALS—The cement for the first coat (base or scratch coat) and second (or brown coat) shall be Medusa Waterproofed Gray Portland Cement, or, if standard Gray Portland Cement conforming to the specifications of the American Society for Testing Materials be used, add two per cent by weight of Medusa Waterproofing Powder (2 lbs. per sack of cement) or Medusa Concentrated Waterproofing Paste (0.6 lb. per sack of cement). (See instructions on container.)

The cement for the third or finish coat shall be Medusa Waterproofed White Portland Cement.

4. FINE AGGREGATE—Fine aggregate shall consist of sand, or screenings from crushed stone or crushed pebbles, evenly graded from fine to coarse, passing when dry a No. 8 screen. Fine aggregates should preferably be of siliceous materials, clean, coarse and free from loam vegetable or other deleterious matter.

5. HYDRATED LIME—Hydrated lime shall meet the requirements of the standard specifications for hydrated lime of the American Society for Testing Materials.

6. COLORING MATTER—Only permanent, lime-proof and sunproof colors shall be used. Finish coats containing colors shall be applied as dry as possible to prevent separation of the colors. The use of Medusa Waterproofing will prevent the gradual fading of a color surface due to a film of efflorescence on the surface.

7. WATER—Water shall be clean, free from oil, acid, strong alkali or vegetable matter.

PREPARATION OF MORTAR—8. MIXING—The ingredients of the mortar shall be mixed until thoroughly distributed and the mass is uniform in color and homogeneous. The quantity of water necessary for the desired consistency should be determined by trial, and thereafter measured in proper proportion. The water shall be added slowly to the dry mix so as to allow the aggregates to absorb as much as possible in the course of mixing.

9. MACHINE MIXING—The mortar shall preferably be mixed in a suitable mortar mixing machine of the rotating drum type. The period of machine mixing shall be not less than three minutes after all the ingredients are introduced into the mixer.

10. HAND MIXING—The mixing shall be done in a watertight mortar box, and the ingredients shall be mixed dry until the mass is uniform in color and homogeneous. The proper amount of water shall then be added and the mixing continued until the consistency is uniform.

11. MEASURING PROPORTIONS—Methods of measurement of the proportions of water shall be used which will secure separate uniform measurements at all times. All proportions stated shall be by volume. A bag of cement (94 lbs. net) may be assumed to contain one cubic foot. Forty pounds may be assumed as the weight of one cubic foot of hydrated lime.

12. RETEMPERING—Mortar which has begun to stiffen shall not be used nor retempered with additional water and used.

13. CONSISTENCY—Only sufficient water shall be used to produce a good workable consistency. **The less water in the mix, the better the quality of the mortar, within working limits.**

MORTAR COATS — 14. PROPORTIONS — All coats shall be one part Waterproofed Portland Cement (white or gray) and three parts fine aggregate; hydrated lime for buttering purposes not to be in excess of 10% by weight of the cement used.

15. APPLICATION—The plaster shall be applied with a steel trowel and carried on continuously in one general direction without allowing the plaster to dry at the edge. If it is impossible to work the full width of the wall at one time, the jointing shall be at some natural division of the surface, such as a window or a door.

The first coat shall thoroughly cover the base on which it is applied and shall be troweled enough to insure the best obtainable bond. Before the coat has set it shall be heavily cross-scratched with a saw-toothed metal paddle or other suitable device to provide a strong mechanical key.

The first coat shall be kept thoroughly wet until the second coat is applied. The second coat shall be brought to a true and even surface by screeding at intervals not exceeding five feet, and by constant use of straightening rod.

When the second coat has stiffened sufficiently, it shall be dry floated with a wood float, and evenly cross-scratched to form a good mechanical bond for the finish coat.

From the time of application of the second coat and for not less than three days thereafter, the stucco must be kept continuously wet by thorough spraying at frequent intervals. It shall then be allowed to dry out thoroughly.

The finish coat shall be applied not less than a week after the application of the second coat. Methods of application will hereinafter be described under "Finish."

16. CURING—To develop maximum strength and density in any Portland Cement product it is necessary to cure it properly. This is especially true of Portland Cement stucco, which is really a thin slab of concrete. **Each coat should be kept damp continuously for at least two days.** Moistening should commence as soon as the stucco

(Top) Residence of S. Goodman, Highland Park, Ill. E. H. Klaber and E. A. Grunsfeld, Jr., Archs. Paul Phillips, Winnetka, Ill., Plaster Contractor. Medusa Waterproofed White Portland Cement used for exterior stucco.

(Center) Swimming Pool and Bath House, Clinton, Iowa. W. E. Bort, Architect. Clinton Engineering Co., General Contractors. Joyce Lumber Co., Dealer. Medusa Waterproofed Gray & White Portland Cements used.

(Bottom Left) Residence of ex-Governor Green at Ionia, Mich. Harry L. Mead, Grand Rapids, Architect. Banhagel Brothers, Ionia, Contractors. Medusa White Waterproofed Cement used for stucco.

(Bottom Right) Residence of Herbert Holmgreen, San Antonio, Tex. Morris & Noonan, Architects. F. O. Holtzman, Plastering Contractor. Medusa Waterproofed White Portland Cement used in the finish coat.

(Top) *Masonic Home, Wichita, Kan. Tilton & Githens, Architects, New York, N. Y. General Contractors, The George H. Siedhoff Construction Co., Wichita. Both Medusa White and Gray Waterproofed Cements used in the stucco.*

(Center Left) *Residence of A. G. Cable, Glencoe, Illinois. Adler and Work, Architects. Paul Phillips, Winnetka, Ill., Plaster Contractor. Medusa Waterproofed White Portland Cement used in stucco.*

(Center Right) *The Anderson Memorial in La Crosse, Wis. Otto A. Merman, La Crosse, Architect. Theo. J. Molzahn and Son, La Crosse, Contractor. Medusa Waterproofed Gray and White Portland Cement used.*

(Bottom) *Residence of James N. Rawleigh, Winnetka, Illinois. Architect—Nester, Geneva, N. Y. Plaster Contractor, Paul Phillips, Winnetka, Ill. Medusa Waterproofed White Portland Cement used in stucco.*

(Continued)

has hardened sufficiently not to be injured, applying the water in a fine fog spray. Avoid soaking the wall. Give it only as much water as will be readily absorbed. To prevent excessive evaporation on the sunny or windward sides of building in hot, dry weather, tarpaulins should be hung over the outside of the stucco and kept moist.

After the damp-curing period, the base coats should be allowed to dry thoroughly before the finish coat is applied. The practice of doubling coats without a two-day moist-curing period followed by a drying interval is not good construction practice. Unlike regular cements, once waterproofed stucco dries out it repels all water at the surface, hence cannot be wet again for proper curing.

When stucco is applied during cold weather, longer curing periods are necessary. In freezing weather it should not be applied unless special methods are employed to keep the materials at a temperature above 50 degrees Fahrenheit for at least 48 hours.

FINISH—17. Stippled—The finishing coat should be troweled smooth with a metal trowel with as little rubbing as possible, and then should be lightly patted with a brush of broom straw to give an even stippled surface.

18. Sand Floated—The finishing coat, after being brought to a smooth, even surface, should be rubbed with a circular motion of a wood float with the addition of a little sand slightly to roughen the surface. This floating should be done when the mortar has partly hardened.

19. Sand Sprayed—After the finishing coat has been brought to an even surface, it should be sprayed by means of a wide, long-fiber brush—a whiskbroom does very well—dipped into a creamy mixture of one part of cement to two or three parts sand, mixed fresh at least every thirty minutes and kept well stirred. This coating should be thrown forcibly against the surface to be finished. This treatment should be applied while the finishing coat is still moist and before it has attained its early hardening—that is, within three to five hours. To obtain lighter shades, add hydrated lime not to exceed 10% of the weight of the cement.

20. Rough-cast or Spatter Dash—After the finishing coat has been brought to a smooth, even surface with a wooden float, and before finally hardened, it should be uniformly coated with a mixture of one sack of cement to two or three cubic feet of fine aggregate wet to the consistency of cream, and thrown forcibly against it to produce a rough surface of uniform texture when viewed from a distance of 20 feet.

Special care should be taken to prevent the rapid drying out of this finish by thorough wetting down at intervals after stucco has hardened sufficiently to prevent injury.

21. Cement Colors—When it is required that any of the above finishes should be made with colored mortar, not more than 10% of the weight of portland cement should be added to the mortar in the form of finely ground mineral coloring matter and this quantity should replace an equal amount of hydrated lime, instead of cement, or used as an additional material.

A predetermined weight of color should be added dry to each batch of dry fine aggregate before the cement is added. The color and fine aggregate should be mixed together and then the cement mixed in.

The whole should be then thoroughly mixed dry by shoveling from one pile to another through a ¼-inch mesh wire screen until the entire batch is of uniform color. Water should then be added to bring the mortar to a proper plastering consistency.

BACKGROUNDS OR BASES

Concrete Blocks, Concrete Surfaces, Tile and Brick

TILE—Tile shall be hard burned with dovetail or heavy ragged scoring. Joints are not to be raked, but cut back to the surface of tile.

Surface of tile shall be brushed free from all dirt, dust and loose particles, and, prior to application of stucco, shall be wet to prevent suction and absorption.

BRICK—Brick shall be rough hard burned brick, set with ⅜-inch joints. Joints to be raked out ½-inch from face of brick. Surface of brick shall be brushed free from all dirt, dust and loose particles, and prior to application of stucco, shall be wet.

Old brick walls which are to be overcoated shall have all loose, friable or soft mortar removed from the joints to a depth of at least half an inch. Brick surfaces, painted or waterproofed, shall be covered with metal lath.

Extremely soft brick must be covered with metal lath of fine poultry wire, well stapled.

CONCRETE BLOCKS – Shall be rough and coarse, but not friable, and set in cement mortar, with joints raked out at least ½-inch deep. Surfaces of blocks shall be brushed free from all dirt, dust and loose particles, and prior to application of stucco, shall be wet.

CONCRETE SURFACES – Concrete surfaces shall be hacked or roughened by drills, so as to provide bond for stucco.

After hacking, surface shall be washed down with a solution of one part muriatic acid to 10 parts water. After acid solution has exhausted itself, surface is to be washed down, to remove any remaining acid. Wirebrush surface so as to remove all loose particles of concrete.

Prior to application of stucco, wet the wall so as to prevent absorption of water from stucco, and apply a good creamy cement grout an hour before applying stucco.

SMOOTH SURFACES—To obtain a smooth surface, after troweled finish has become sufficiently hard, rub carefully with a fine carborundum stone and water, rinse with clean water, grout with clear cement and allow to remain for a week or longer; rub to smooth finish.

STUCCO ON METAL LATH

Where Sheathing Is Used

SHEATHING – Sheathing boards shall not be less than six inches nor more than eight inches wide, dressed on one or both sides to a uniform thickness of 13/16 of an inch; laid horizontally across wall studs, and fastened with not less than two 8d nails at each stud.

Over sheathing boards shall be laid, in horizontal layers beginning at the bottom, a substantial paper well impregnated with tar or asphalt. The bottom strip shall be laid over the baseboard at the bottom of the wall, and each strip shall lap the flashings at all openings.

BACK-PLASTERED – NO SHEATHING – Framing—Studs spaced not to exceed 16-inch centers should be run from the foundation to rafters without any intervening horizontal members. The studs should be tied together just below the floor joists with 1 x 6 inch boards which should be let into the studs on their inner side, so as to be flush, and securely nailed to them. These boards will also act as sills for floor joists, which should be securely spiked to the side of studs.

BRACING—Corners of each wall shall be braced diagonally with 1 x 6 inch boards let into studs on inner side, and securely nailed to them.

In back-plastered construction in which sheathing is omitted at least once midway in each story height, the studs shall be braced horizontally with 2 x 3 inch bridging set one inch back of the face of the studs. This assumes that the studs are 2 x 4 inches. Larger siges require larger bridging.

FURRING—One-half inch 22 gauge crimped furring is to be fastened direct to the studding, using 1¼ inch by 14 gauge staples placed 12 in. apart.

LATH—Expanded metal, or wire mesh, galvanized or painted, weighing at least 3.4 pounds per square yard.

Metal lath shall be placed horizontally, drawn tight, and attached with 1¼ inch by 14 gauge staples, or 6d nails driven to a penetration of at least ⅞ inch and bent to engage at least one rib, not over eight inches o. c.

Lath shall be lapped at least two inches horizontally and tied with 18 gauge black tie wire at least once between studs. Vertical laps shall be at least two inches and shall occur at supports. Lapped ends fastened with staples or 6d nails not over four inches o. c.

CORNERS—The sheets of metal lath shall be folded around the corners for at least four inches and well stapled down in sheathed construction and one stud opening in open frame construction.

Corner bead is not recommended, but a strip of diamond mesh expanded metal, 24 gauge, formed to a six inch angle, may be used.

INSULATION—The air space in back-plastered walls may be divided by applying building paper, quilting, felt, or other suitable insulating material between the studs, fastening it to the studs and bridging by nailing wood strips over the folded edges of the material. This insulation shall be so fastened as to leave about one inch air space between it and stucco. Keep insulating material clear of stucco. Make tight joints against the framing.

BACKING COAT—Shall be applied directly following the completion of the brown coat. The keys of the scratch coat shall first be thoroughly dampened, and the backing coat well troweled on to insure filling spaces between keys and thoroughly covering back of lath. The backing coat shall provide a total thickness of plaster back of lath of ⅝ or ¾ of an inch.

SPECIFICATIONS for waterproofing existing concrete work

PREPARATION OF SURFACE

ON OLD CONCRETE OR CEMENT PLASTER—The old surface shall be mechanically roughened or hacked by means of stone mason's hammer, drills or similar tools, exposing the matrix of the concrete and leaving ¼ inch to ⅜ inch deep holes every two to three inches, so as to provide a better bond for the cement plaster.

Remove all loosened pieces and apply freely to the cleaned area a solution of one part muriatic acid and ten parts of water, using a fibre or acid brush. Allow acid solution to remain until the acid exhausts itself, approximately 10 minutes.

Wash the surface with water from a hose, being careful to remove all of the acid solution. Go over the walls with a stiff wire brush, or where available, compressed air or steam may be used, and remove any remaining loose pieces or particles.

ON BRICK, CONCRETE BLOCKS OR MASONRY—Mortar joints shall be raked out to a depth of ½ inch to ¾ inch and all old and loose mortar removed. This is absolutely necessary in order to give good key for the plaster. Prepare a grout of Medusa Portland Cement and water.

Mix to a creamy consistency and apply with a fibre brush to the cleaned surface, brushing with grout thoroughly into the concrete for a short distance ahead of the plaster.

All masonry surfaces shall be thoroughly saturated with water before grouting is applied.

REMOVING OLD PAINT—All oil paint films or whitewash must be thoroughly removed.

MATERIALS

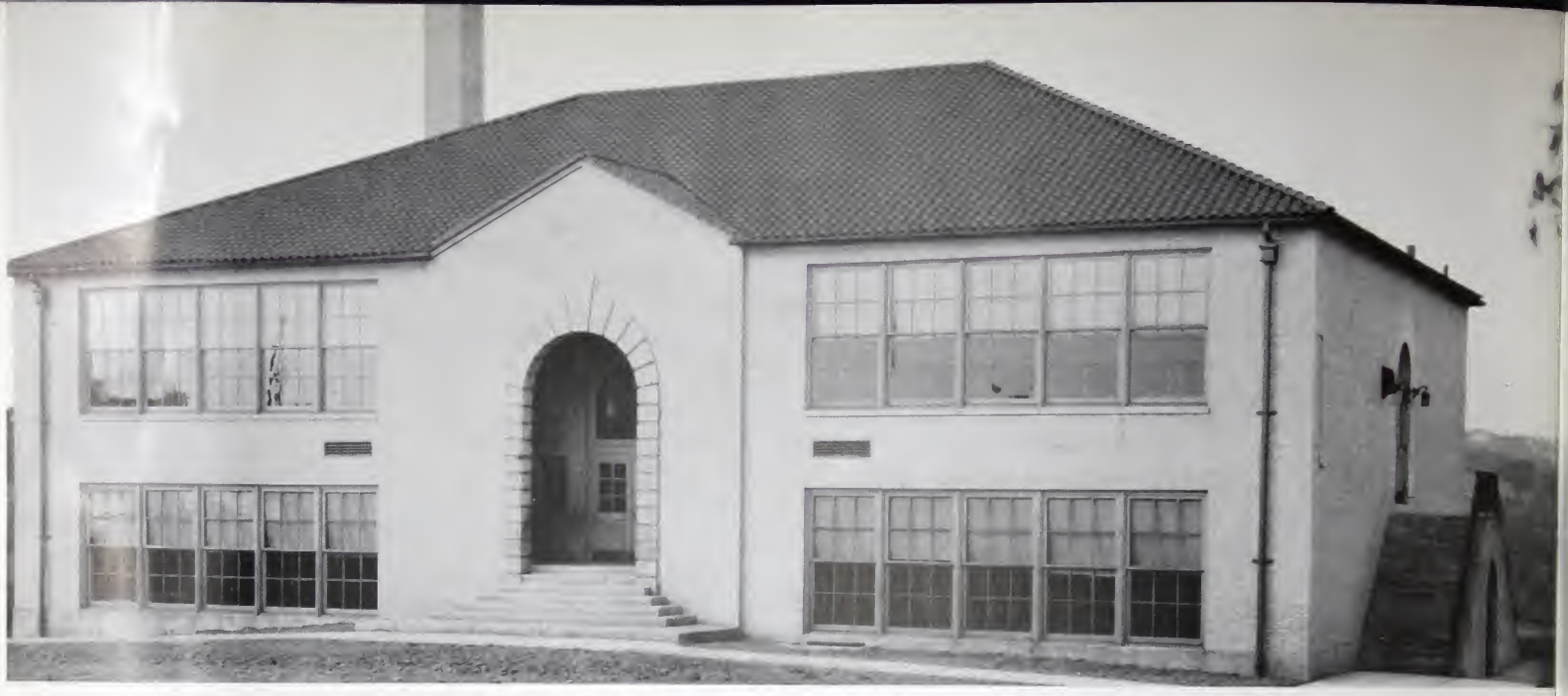
PROPORTIONS—The cement plaster shall be composed of one part Medusa Waterproofed Gray Portland Cement and two and one-half parts sand.

WATERPROOFING—If Medusa Waterproofed Cement is not available, use Medusa Waterproofing, either Powder or Concentrated Paste, to waterproof the portland cement employed. Follow the simple directions on the container.

SAND—Shall be clean, sharp and free from clay, loam, vegetable or other injurious matter, ⅛ inch down in size.

MIXING—Use materials as heretofore specified, mix the waterproofed cement plaster to a stiff, workable consistency, adding the water slowly, using the minimum volume of water necessary to give a plastic mix.

Y. M. C. A. Building, Evanston, Illinois
Chester H. Walcott, Chicago, Ill., Architect N. P. Severin Co., Chicago, Contractor
Medusa Waterproofed Gray Portland Cement used in all concrete below grade and in swimming pool.



Seville School, Ross Township, Pa. Press C. Dowler, Pittsburgh, Pa., Architect Powell Bros., New Kensington, Pa., Contractors
Medusa Waterproofed Gray Portland Cement used in brick mortar and foundation.

IN CASE WATER INTERFERES WITH THE WORK—If there is a continual seepage through the walls, holes must be bored in the walls and tubes or small gas pipes inserted to concentrate the flow of water and relieve the pressure while the plaster coat is being applied. Caulk around pipes with oakum or lead wool. Drainage pipes should remain open until the waterproofed cement plaster coat has thoroughly set and is capable of resisting the pressure by its own adhesive strength, after which remove pipes and plug holes, covering them with waterproofed cement plaster.

WATERPROOFED CEMENT PLASTER

APPLICATION OF CEMENT PLASTER—Saturate the entire surface with water to prevent the surface from absorbing water from the cement plaster before the cement has had time to hydrate or set.

Apply the first coat of plaster ⅜ inch thick, troweling the plaster well into the surface so as to secure a proper bond.

Scratch the first coat with a "scratcher." Do not use nails or trowels, nor scratch too deep.

As soon as the first coat has set hard enough, sprinkle with water and apply the second coat ⅜ inch thick, troweling the plaster with sufficient pressure to obtain maximum density and to close all surface pores, leaving a tight, close-grained finish.

Where waterproofed cement plaster is to be applied to walls and floors, cut second coat of plaster off six inches above the finished floor line.

Where joints must be made in cement plaster work, run the cement work an inch or two beyond the contemplated joint. After plaster has set, cut this surplus off on as broad bevel as possible, giving this bevel a coat of grout prior to applying subsequent plaster.

The finished surface must be protected from too rapid drying out, by keeping moist for at least a week to allow it to harden thoroughly and to prevent hair cracks. Sprinkle at frequent intervals with a hose, or cover with canvas or burlap kept continually wet.*

WATERPROOFED FLOOR TOPPING

FLOORS — Water gathering under basement floors exerts an upward pressure which often is strong enough to crack the concrete floor.

If existing floors have been cracked by water under the floor, the waterproofed portland cement topping applied to the top of the old floor should be sufficiently reinforced to prevent cracking.

APPLICATION OF FLOOR TOPPING — After walls have been plastered, prepare the surface of floors, including the six inch base at walls, in the same manner as walls (see "Preparation of Surface").

Have floors cleaned, saturated with water and apply grout as described; use care to prevent mud or dirt being tracked over the grouted surface. Apply a two-inch coat of waterproofed cement floor topping as per specifications for bonded concrete floor finish, page 14, joining the covered base with the finished wall cement plaster.

*After the plaster coat has been applied, Medusa Portland Cement Paint should be applied to give better diffusion of light and a washable surface that is easy to keep clean.

SPECIFICATIONS for waterproofing concrete blocks during the process of manufacturing

The block manufacturer will find the following specifications of value.

CEMENT—The cement used shall be Medusa Waterproofed Gray Portland Cement.

COARSE AGGREGATE—Coarse aggregate shall consist of clean pebbles, crushed limestone, granite or trap rock, well graded so that the largest size will not exceed one third of the thickness of the thinnest web of the block. Not more than five percent shall pass a ¼-inch screen.

FINE AGGREGATE—Fine aggregate shall consist of sand or screenings from hard crushed limestone, granite or trap rock, well graded and free from dust, which shall pass though a ¼-inch screen, and shall not contain more than five percent of silt, loam or impurities. It should have at least 15% retained on a ⅛-inch screen.

PROPORTIONS—The mixture of waterproofed cement, sand and stone must be such that the block will comply with the governing Building Code, whether city or state. In some states and cities this requirement is a compressive strength of not less than 750 pounds per square inch; in other localities the requirements are 1,000 pounds or more.

The block manufacturers should experiment with the sand and stone available until he can give the required strength with the least amount of cement per block. As an illustration, some manufacturers obtain 20 or 22 blocks with block size of 8" x 8" x 16" from one sack of cement, whereas others, due to poorly graded aggregate, cannot obtain more than 14 or 16 blocks per bag of cement. In general, the coarser the grading of aggregate the greater the strength for a given amount of cement provided the mix is workable in the machine. However, too coarse grading tends toward rough surfaces and edges.

The mix for the facing on blocks shall consist of one part Medusa Waterproofed Gray Portland Cement and three parts of clean sand.

HAND MIXING—Dampen the sand or aggregate, add the waterproofed cement, and mix as usual. When sand and waterproofed cement are uniformly mixed, add only enough water to secure proper consistency.

BATCH MACHINE MIXING—Put the sand and aggregate into the mixer with the waterproofed cement; allow mixer to run until the cement and sand are well mixed before adding additional water. Mix at least one and one half minutes after all water is added. In dry tamp method, mix at least two minutes.

CONSISTENCY—Sufficent water shall be used to permit the blocks to be removed from the molds without distortion, but not so much as to cause sagging.

CURING—All concrete blocks should be thoroughly cured by keeping them in well built steam kilns, by keeping them wet by the use of fog sprays, or by sprinkling them often enough so surfaces will not become air-dry.

Proper and thorough curing is one of the most essential and important steps in the manufacture of concrete blocks.

Send for booklet on recommended practice for the manufacture of blocks.

Residence of Miss Anna Zotter, St. Clair River, Detroit. Blocks supplied by State Builders Supply Co., Detroit.

SPECIFICATIONS for the waterproofing of concrete brick and roofing tile

The manufacture of concrete brick and concrete roofing tile has been increasing rapidly in the last few years. Manufacturers of complete equipment for making concrete brick and concrete tile have established independently owned manufacturing units.

Concrete brick and tile have the advantage of being lighter in weight, easier to handle and transport, and easy to lay up, permanent, beautiful and fireproof. They can be made in any range of colors, shades and textures or combinations, also in any size, thereby offering the builder or architect a wide variety to meet the needs in design.

Because the materials for manufacturing concrete brick and tile are universally available, the manufacturing plants can be erected in practically any market, thereby saving tremendously on freight and trucking charges.

SPECIFICATIONS—Aggregate used in concrete brick shall be hard and sharp. Grading should start with a ⅜-inch mesh. About 5% should be left on a ¼-inch mesh, approximately 15% on a ⅛ inch mesh, 15% on a 14-mesh, 25% on a 28-mesh, 30% on a 48-mesh, 10% on a 100-mesh.

It is of course not necessary to adhere strictly to this gradation, for there are other variations as good but this principle applies to every kind of concrete unit. The better the aggregate is graded, the better the units will be.

RATIO OF MIX—The ratio of mix is one part of Medusa Waterproofed White or Waterproofed Gray Portland Cement to seven parts of sand, up to one part of Waterproofed White or Waterproofed Gray Portland Cement to ten parts of sand. Materials should be mixed with the water for four minutes. In cold weather the water should be warmed. To obtain the proper water content, a handful of mix, stroked with the trowel, should bring beads of moisture to the top.

KILN CURING—Cement brick gets its initial set over night in store room. If cured in steam kilns, the starting temperature should be 70°, and then run up to 100 or possibly 110°. Brick should be kept in this temperature over night. Wet steam should be used at a low pressure of about five pounds. The amount of relative humidity should be at least 90%.

WATER CURING—Brick should stand over night to get initial set, then pile in yard and wet down with a hose as necessary to keep them wet continuously for at least ten days. Care should be taken in the summer time to see that bricks do not dry out too fast. Likewise in winter, care should be taken so bricks do not freeze together.

The use of Medusa Waterproofed Gray or Waterproofed White Portland Cements in making concrete brick and tile does not vary the specifications. Waterproofed cements are used exactly the same way as ordinary gray cement.

Waterproofed concrete brick repels all water at the surface and is particularly advantageous as a means of preventing efflorescence and disintegration. In unwaterproofed concrete, brick or tile, dirt accumulates on the surface, is carried by water when the latter is absorbed, into the surface. If waterproofed cements are used, the water laden with dirt cannot be absorbed into the surface, but the dirt itself is washed off. Waterproofing concrete brick also prevents deterioration due to absorbed water entering tiny crevices or pores, freezing, causing crumbling. All water is repelled at the surface. To prevent mortar deterioration, all concrete brick should be laid in mortar made with Medusa Waterproofed Portland Cement.

Natural colored Dunbrik home in Atlanta, Georgia.

Dunbrik is used in solid and hollow wall construction, plain or faced.

Buff mat glazed Dunbrik home with a green mat glazed Duntex roof, Metropolis, Illinois.

THE TWELVE MEDUSA PRODUCTS

MEDUSA GRAY PORTLAND CEMENT

A standard Gray Portland Cement guaranteed to comply with the specification requirements of the American Society for Testing Materials.

MEDUSA WATERPROOFED GRAY PORTLAND CEMENT

Our standard Gray Portland Cement with the proper amount of Medusa Integral Waterproofing ground in at the mill. It is less expensive than adding waterproofing on the job, and insures proper distribution. It should be used wherever concrete is below grade or exposed to moisture or dampness.

MEDUSA "MEDCO" HIGH EARLY STRENGTH CEMENT

High Early Strength Cement has all the properties of our standard Gray Portland Cement but with this difference—it has the normal 5 to 7 days' strength in 24 hours.

MEDUSA WHITE PORTLAND CEMENT

A standard Portland Cement used wherever Portland Cement is specified and white or colored effects are desired—same strength as Gray Portland Cement—non-staining.

MEDUSA WATERPROOFED WHITE PORTLAND CEMENT

Our standard White Portland Cement with the proper amount of Medusa Integral Waterproofing ground in during process of manufacture. Used for stucco and stone mortar and all work subjected to damp or wet conditions. Non-staining.

MEDUSA STONESET CEMENT

A non-staining waterproofed mortar cement for setting, pargeting, and pointing of cut stone, and for laying up face brick. The cost permits use for mortar in backup wall.

MEDUSA BRIKSET CEMENT

Has a Portland Cement base and is waterproofed. Obtains a high early strength which is very important to the mason contractor. It has a very pleasing color when used natural or with mortar colors. It is a prepared masonry mortar having minimum shrinkage; simply mix with sand and water on the job.

MEDUSA PORTLAND CEMENT PAINT

A decorative and protective coating for all concrete and masonry surfaces. Can be applied on fresh concrete or wet surfaces. Furnished in black, white and seven colors.

MEDUSA FLOOR COATING

A concrete floor covering that needs no undersurfacer. It is moistureproof and highly resistant to abrasive wear. Furnished in black, white and six colors.

MEDUSA-LITE

A flat wall finish for interior use. Comes in white and seven beautiful colors, is durable, quick drying, economical. One coat is usually sufficient.

MEDUSA WATERPROOFING POWDER

A dry powder to be added to Portland Cement. By its use, concrete is waterproofed. It is to be used where Medusa Waterproofed Gray Portland Cement or Medusa Waterproofed White Portland Cement is not available. Powder is shipped in 40 lb. bags.

MEDUSA CONCENTRATED WATERPROOFING PASTE

Similar results are obtained as with the powder. It is added to the concrete mix through the gauging water. Paste is shipped in 8 lb. and 40 lb. containers. Also furnished in 225 lb. and 400 lb. drums.

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